

SN. 09/881,196 ATTORNEY DOCKET NO. CANO:030

IN THE CLAIMS

The status of claims in this application is as follows:

1-10.(Cancelled)

11. (New) An arithmetic decoding method of decoding arithmetically encoded image data formed of at least one bitplane, by using a single arithmetic operation section and a plurality of memories that can be accessed separately, comprising the steps of:

receiving information on a bit depth of the arithmetically encoded image data;

storing, when the bit depth of the arithmetically encoded image data is equal to a number of the memories, state variables corresponding to pixels to be decoded, of respective bitplanes of the image data in respective corresponding ones of the memories;

storing, when the bit depth of the arithmetically encoded image data is less than the number of the memories, one of the state variables corresponding to pixels to be decoded, of each bitplane of the image data, in at least part of the memories by allocating the one of the state variables thereto;

reading ones of the state variables corresponding, respectively, to pixels to be decoded, of each bitplane, from the memories;

selecting ones of the state variables read from the memories based on data which have been arithmetically encoded by the arithmetic operation section; and

inputting the selected ones of the state variables and values of a more probable symbol which are paired with the selected ones of the state variables, to the arithmetic operation section.

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12. (New) An arithmetic decoding method according to claim 11, wherein the probable symbol values are stored together with the selected ones of the state variables paired therewith in the memories according to the information on the bit depth of the image data.

13. (New) An arithmetic decoding method according to claim 11, wherein said reading step comprises reading and holding ones of the state variables that can actually correspond to each pixel to be decoded, from the memories, before which of the ones of the state variables actually correspond to the pixel is known, when the bit depth of the image data is an even number and is equal to half of a number of the memories; and

said selecting step comprises selecting one of the ones of the state variables read from the memories and held, which is known to actually correspond to the pixel.

14. (New) An arithmetic decoding method according to claim 11, further comprising the steps of:
storing the decoded image data per pixel in a buffer memory; and
generating a context from the image data stored in the buffer memory according to the information on the bit depth of the image data.

15. (New) An arithmetic decoding method according to claim 11, wherein the state variables comprise one of a state value and a probability estimate.

16. (New) An arithmetic decoding device for decoding arithmetically encoded image data formed of at least one bitplane, comprising:

a single arithmetic operating section that carries out an arithmetic operation;

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a plurality of memories that can be accessed separately;

a bit mode input section that inputs information on a bit depth of the arithmetically encoded image data;

a storage control section that stores, when the information input by said bit mode input section indicates that the bit depth of the arithmetically encoded image data is equal to a number of the memories, state variables corresponding to pixels to be decoded, of respective bitplanes of the image data in respective corresponding ones of said memories, and stores, when the information input by said bit mode input section indicates that the bit depth of the arithmetically encoded image data is less than the number of said memories, one of the state variables corresponding to pixels to be decoded, of each bitplane of the image data, in at least part of said memories by allocating the one of the state variables thereto;

a reading section that reads ones of the state variables corresponding, respectively, to pixels to be decoded, of each bitplane, from said memories;

a selecting section that selects ones of the state variables read from said memories based on data which have been arithmetically encoded by said arithmetic operation section; and

input section that the selected ones of the state variables and values of a more probable symbol which are paired with the selected ones of the state variables, to said arithmetic operation section.

17. (New) An arithmetic decoding device according to claim 16, wherein the probable symbol values are stored together with the selected ones of the state variables paired therewith in said memories according to the information on the bit depth of the image data.

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18. (New) An arithmetic decoding device according to claim 16, wherein said reading section reads and holds ones of the state variables that can actually correspond to each pixel to be decoded, from said memories, before which of the ones of the state variables actually corresponds to the pixel is known, when the bit depth of the image data is an even number and is equal to half of a number of said memories; and

said selecting section selects one of the ones of the state variables read from said memories and held, which is known to actually correspond to the pixel.

19. (New) An arithmetic decoding device according to claim 16, further comprising:

a buffer memory that stores the decoded image data per pixel; and

a context generating section that generates a context from the image data stored in said buffer memory according to the bit depth of the image data.

20. (New) An arithmetic decoding device according to claim 16, wherein the state variables comprise one of a state value and a probability estimate.

21. (New) A computer-readable medium storing a program for causing a computer to execute an arithmetic decoding method of decoding arithmetically encoded image data formed of at least one bitplane, by using a single arithmetic operation section and a plurality of memories that can be accessed separately,

the program comprising:

a receiving module for receiving information on a bit depth of the arithmetically encoded image data;

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a storage module for storing, when the bit depth of the arithmetically encoded image data is equal to a number of the memories, state variables corresponding to pixels to be decoded, of respective bitplanes of the image data in respective corresponding ones of the memories, and for storing, when the bit depth of the arithmetically encoded image data is less than the number of the memories, one of the state variables corresponding to pixels to be decoded, of each bitplane of the image data, in at least part of the memories by allocating the one of the state variables thereto;

a reading module for reading ones of the state variables corresponding, respectively, to pixels to be decoded, of each bitplane, from the memories;

a selection module for selecting ones of the state variables read from the memories based on data which have been arithmetically encoded by the arithmetic operation section; and

an input module for inputting the selected ones of the state variables and values of a more probable symbol which are paired with the selected ones of the state variables, to the arithmetic operation section.

22. (New) An arithmetic decoding method of decoding arithmetically encoded binary image data and multi-level image data, by controlling a single arithmetic operation section commonly usable for processing both the binary image data and the multi-level image data, and a plurality of memories for storing sets of state variables including a more probable symbol used for an arithmetic operation by the arithmetic operation section,

the arithmetic decoding method comprising the steps of:

receiving the arithmetically encoded image data and information on a bit depth of the arithmetically encoded image data;

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controlling selection of storing sets of the state variables, each set corresponding to pixels to be decoded, of one bitplane of the image data, in respective ones of the memories in association with respective bitplanes of the image data, or storing a set of the state variables corresponding to pixels to be decoded, of each bitplane of the image data in at least part of the memories by allocating the set of the state variables thereto, according to the information on the bit depth; and

inputting the sets or set of the state variables stored in the memories or the at least part thereof, in an order determined according to the bit depth of the image data, to the arithmetic operation section.

23. (New) An arithmetic decoding method according to claim 22, further comprising a selection step of selecting at least one valid set of state variables from the sets or set of the state variables stored in the memories or the at least part thereof, according to the bit depth of the image data.